PRELIMINARY RESULTS ON THE ORGANIC GROWING OF SOME SMALL FRUITS SPECIES

REZULTATE PRELIMINARE PRIVIND CULTURA ÎN REGIM ORGANIC A UNOR SPECII DE ARBUŞTI FRUCTIFERI

MLADIN Paulina[1], SUMEDREA M.[1], COMAN M.[1], CHIŢU E.[1], NEAGOE A.[2], OPREA E.[2], SUMEDREA D.[1], MLADIN Gh.[1], CHIŢU Viorica

Abstract *Studies were conducted during 2008 – 2009 period and had two objectives: 1) determining the effect of inoculation with mycorrhizal fungi on the blueberry plants for optimizing growth and fruiting conditions and 2) to determine the effect of biological, ecological and low risk products, acceptable for organic farming, on blackcurrant and raspberry pests and diseases control. To study the colonization with mycorrhize were used inoculi of the fungi Glomus intraradices. To study the disease control, were applied 5 treatments with products based on copper and two treatments for aphids and mites with Bionid ecological product (5%). In addition, for black currant Sesia tipuliformis control, pheromone traps, AtraSyn T type (8, 10 and 12 traps ha^{-1}) were dispersed in plantation. Mycorrhizal inoculation induced a significant increase of plants growth in the first year after application. All treatments for pests and diseases control had a good effect, without any phytotoxicity symptoms.*

Key words: mycorrhize pest, disease, control, ecological product

Rezumat *Cercetările s-au desfăşurat în perioada 2008- 2009 şi au avut două obiective : 1. stabilirea efectului inoculării cu micorize asupra plantelor de afin în scopul optimizării condiţiilor de creştere şi fructificare, şi 2. stabilirea efectului unor produse de combatere biologică şi a produselor cu risc redus, acceptate pentru cultura organică, asupra bolilor şi dăunătorilor coacăzului negru şi zmeurului. Pentru studiul colonizării cu micorize s-au folosit innoculi de Glomus intraradices . Pentru studiul combaterii bolilor s-au aplicat câte cinci tratamente cu produse pe bază de cupru, iar pentru afide şi acarieni două tratamente cu produsul biologic Bionid (5%). În plus, la coacăzul negru pentru Sesia tipuliformis s-au utilizat capcane cu feromoni tip AtraSyn T (8 şi 12 capcane /ha). Innoculul cu micorize a indus o creştere semnificativă a plantelor în primul an după aplicare. Tratamentele au avut efect bun şi fără simptome de fitotoxicitate.*

Cuvinte cheie: micoriza,dăunători, boli, combatere, produse ecologice

INTRODUCTION

Highbush blueberry, as any species belonging to the *Ericacaee* family manifest mycorrhiza phenomenon, a symbiotic association between plant root system and some saprophytic fungi, fungus providing to the plant nutrients readily available, which they extracted from soil organic matter (1).

For many species under organic culture, using symbiotic fungi has become a common practice. High nitrogen requirements of the blueberry may

be provided by additional use of mycorrhiza fungi, which, by decomposition of soil organic matter, provides plant nutrients in readily accessible form.

The present research tries to establish the influence of such fungi on vegetative growth of blueberry plants.

The organic culture precludes the use of anorganic products and organic chemical synthesis plant treatments. To combat diseases and pests are allowed only organic products and those of copper and sulfur, considered "low risk" and accepted by the concept of organic culture. For black currant and raspberry crop research, the main objective was to determine the efficacy of copper fungicides on specific pathogens, of organic insecticide Bionid on the specific pests and of sex pheromone traps for black currant cane borer.

MATERIAL AND METHOD

Experiment 1. For studying the influence of mycorrhiza on the vegetative growth of highbush blueberry plants, an experiment with plants of Bluecrop variety, aged two years was performed. The plants were planted in pots with acid peat substrate, with the following variants: V1-expanded clay 10% + 90% peat; V2-innoculi of *Glomus intraradices* 10% + peat 90% and V3-acid peat 100%, version control. For each variant were used three plants in three repetitions, the plots being randomized. There were determined the amount of vegetative growths, the number of annual shoots and the length of shoots when applied the treatments, December 15, 2008, and after one year of vegetation, December 15, 2009.

Experiment 2. For the control of raspberry pathogens four variants were applied: V1-Alcupral 50 PU 0.3%, V2- Bordeaux mixture 0.5%, V3-Standard (Vondozeb 0.2%) and V4-untreated control. All three variants were applied repeatedly in four phenological phases: 1. green tip, 2. two fruit-binding, 3. after harvest time and 4. 10 days after the last treatment. Observations were made during October 15 to 30 and consisted in: the frequency and intensity of attacks on leaves and stems, in which: Frequency - determination by measurements; intensity - ”+” sign means few spots (1-5), 1. ¼ quarter of observed area, 2. ½ of leaf or stem surface; 3. ¾ of leaf or stem surface and 4. entire surface with symptoms of attack.

Experiment 3. For black currant diseases have applied the same options as the raspberry, copper-based products compared with standard products and version control, untreated: V1 - Alcupral 50 PU 0.3%, V2 - Bordeaux mixture 0.5%, V3-Standard (PU Topsin 70 0.07% and PU Vondozeb 80 0.2%) and V4 - Untreated. Treatments were applied four times: 1.when 75% of the fruit sets, 2. first fruits colored on the strig, 3. after harvest and 4. 10 days after the last treatment. Observations and determinations on attack frequency and intensity were made between September 15 and 30.

Experiment 4. For biological control of black currant cane borer (*Sesia tipuliformis* sin. *Synanthedon tipuliformis*), were applied sex pheromone traps in increased doses, type AtraSyn T, the choice being of 8, 10 and 12 traps ha^{-1}. Installation of pheromone traps was achieved in early May and adults was twice weekly flight tracking of setting. Attacked shoots were observed and the number of larvae inside them was determined.

Experiment 5. For controlling black currant pest (aphids, mites and cane borer) and raspberry aphids and mites, an organic product - Bionid was used. It

was applied at a dose of 50 l in 1000 l solution ha^{-1} at two dates: May, 22th and July, 20th and comments were made on September 3. The attack was assessed by grades, 0-4, where: 0 - default attack, 1 - weak attack, 2-middle attack, strong attack 3 and 4 –powerful attack.

RESULTS AND DISCUSSIONS

Experiment 1. In the first year after application of *Glomus intraradices* innoculi (V2) it was found that a significant amount of vegetative growth was induced, providing statistical differences compared with variants V1 and V3 (table 1). V1 clay substrate induced the lowest vegetative growth of the plants.

Table 1

The influence of the planting substrate on vegetative growth of blueberry plants

Variants	Time of measurements						
	December 2008			December 2009			The difference in the shoots length sum (cm/plants)
	Shoots length sum (cm/plant)	Number of shoots /plant	Average length of shoots (cm)	Shoots length sum (cm/plant)	Number of the shoots/plant	Average length of the shoots (cm)	
V1- expanded clay 10% + peat 90%	93.5	5.75	16.8	246.5	15.5	21.05	153.00
V2- innoculi of *Glomus intraradices* 10 % + peat 90%	74.0	5.25	15.8	291.7	14.2	22.32	217.75
V3-peat 100%	73.5	5.0	15.3	258.2	13.2	19.87	184.75
DL 0,05%							0.118

Experiment 2. The data in Table 2 reveals that PU Alcupral 50 0.3% and Bordeaux mixture 0.5% had a very good effect compared with untreated control variant. Also, compared with the alternative products applied, both products had similar efficacy or even better versus the standard one (*Mycosphaerella*, *Didymella*, *Botrytis* and *Erwinia*). Even if the pathogen *Botrytis cinerea* had a higher frequency of attack (F% = 20) compared with standard products (F% = 10), the intensity of this attacks was quite low (I = 1) and similar with V3.

Experiment 3. By applying the same products for black currant leaf diseases control, were recorded similar results and even better than standard

products. The results were obtained both for control of rust, powdery mildew on leaves and shoots and in combating of the anthracnose (table 3).

Experiment 4. Regarding controlling the cane borer of black currant using increased dose of sex pheromone traps, type AtraSyn T, the results are presented in Table 5. Experimental data showed that the flight of adults began on May 19th and lasted until June, 29th, the flight lasting approximately 42 days.

The flight peak occurred during May, 30th –June, 17th, when on captured between 23 and 11 butterflies on traps. Based on the results of monitoring pests populations with sex pheromone traps, can be seen that the level of infection was different in the three experimental plots, the amount of butterflies captured in traps oscillating between 52 and 138 males. *Sesia* larvae attack frequency was from 5.7% in the variant with 10 traps ha^{-1} and 9.0% with 8 and 12 traps ha^{-1}.

Experiment 5. Results obtained by organic insecticide Bionid 5% application, presented in Table 5, showed a good performance in raspberry, both for aphids and mites, compared with untreated control variant. In black currant, by the application of 2 key treatments with the product Bionid, the class attack was 0 for aphids and 1 for mites. The larvae attack rate of cane borer larvae was only 1%.

Table 2

Frequency and intensity of the pathogens attack by the application of the copper and standard products for disease control in raspberry

VARIANT /PRODUCT /DOSE	*ELSINOE VENETA* (ANTHRACNOSE OF THE SHOOTS)		*PHRAGMIDIUM RUBI-IDAEI* (RASPBERRY RUST)		*MYCOSPHAERELLA RUBI*		*DIDYMELLA APPLANATA*		*BOTRYTIS CINEREA* (GREY MOLD)		*ERWINIA AMYLOVORA* (FIRE BLIGHT	
	F %	I	F %	I	F %	I	F %	I	F %	I	F %	I
V1- Alcupral 50 PU 0,3	4.6	+	0	_	0	_	0	_	20.0	1	0	_
V2- Bordeau mixture 0.5	4.6	+	0	_	0	_	0	_	20.0	1	0	_
V3- Standard	2.4	+	0	_	5.0	+	10.0	1	10.0	1	10.0	1
V4-Control	95.0	4	10.0	+	50.0	2	100.0	3	100.0	3	80.0	3

F% = determination using measurements, Intensity: +. = few spots (1-5 spots), 1. = ¼ of the surface, 2.= ½ of the surface area , 3.=+ ¾ of the surface area, 4. = entire surface.

Table 3

The effect of copper products application on pathogens attack frequency and intensity compared with standard one, in black currant

VARIANT /PRODUCT /DOSE	*PSEUDOPEZIZA RIBIS* (ANTHRACNOSE)		*CRONARTIUM RIBICOLA* (RUST)		*SPHAEROTHECA MORS-UVAE* (MILDEW)			
	Attack on leaves		Attack on leaves		Attack on leaves		Attack on shoots	
	F %	I	F %	I	F %	I	F %	I
V 1-Alcupral 50 PU 0,3	21.4	+ _ 1	2.7	+	0.7	+	16.0	+
V2 – Bordeaux mixture 0,5	26.2	1	4.5	+	2.0	+	16.0	1
V 3-Standard	36.0	+	14.0	+	1.2	+	16.0	1
V 4-Control	81.0	2-4	75.8	3	8.6	2	62.0	3

Table 4

The number of captured adults and larvae attack frequency *Sesia tipuliformis* by the application of the pheromone traps to black currant.

Variant (traps/ha)	Total no. of adults during the flight	Number of observed shoots	Of which:				Frequency of the attack %
			Healthy shoots	Attacked (with larvae):			
				1 larvae	2 larvae	3 larvae	
8 traps/ha	52	500	456	37	5	2	9.0
10 traps/ha	116	500	471	29	0	0	5.7
12 traps/ha	138	500	453	45	1	1	9.0

Table 5

Effectiveness of Bionid in raspberry and black currant pests' control

Variant	Crop	Class of attack (note)		Frequency of the attack (%)
		Aphids	Spider mites	Cane borer
V1-Bionid 5 %	Raspberry	0	0	-
V2-Control		1	5	-
V1-Bionid 5 %	Black currant	0	1	1
V2-Control		4	5	15.3

CONCLUSIONS

1. After just one year after application, blueberry plants inoculated with the fungus *Glomus intraradices* 10% + peat 90% induced a higher vegetative growth, providing statistical differences compared to plants inoculated only with expanded clay or acid peat.

2. 50 PU treatments Alcupral 0.3% and Bordeaux mixture 0.5 %, applied repeatedly had a good efficacy and similar to those standard products against fungi and bacteria in raspberries culture, as well as the main pathogen of black currant.

3. Application of sex pheromone traps in dose of type T AtraSyn of 10 traps ha^{-1} had the best effect on decreasing the number of larvae in the shoots, i.e. a frequency of only 5.7% of the pest.

4. Repeated treatments with organic insecticide Bionid, concentration of 5%, led to reduction up to eliminate the pests of aphids, spider mites and cane borer type, in black currant and raspberry.

REFERENCES

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